TECHNOLOGY DEPT.

INSTITUTE OF PETROLEUM REVIEW

PUBLIC LIBRARY
SEP 15 1952
DETROIT

Vol. 6. No. 68, AUGUST 1952 Price 1/6d. Annual Subscription, Fifteen Shillings

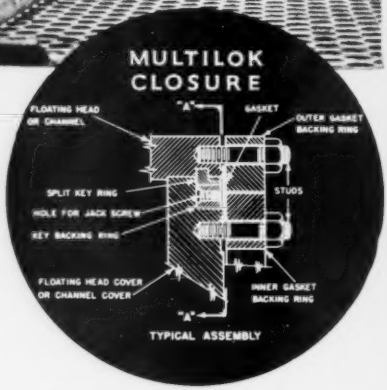
CRAIG
WAX DISTILLATE
CHILLERS

We have for many years specialised in the design and construction of all types of plant for the Extraction and Refining of Wax. Such plant comprises Exchangers and Chillers, High Pressure Filter Presses, Sweating Stoves and Moulding Presses.

We specialise in all types of Heat Exchange Equipment including exchangers, condensers, coolers and reboilers.

A. F. CRAIG & COMPANY LIMITED
CALEDONIA ENGINEERING WORKS
PAISLEY SCOTLAND
London Office: 727, Salisbury House, London Wall, E.C.2. Telephone: MONARCH 4756

PUBLISHED BY THE INSTITUTE OF PETROLEUM
26, Portland Place, London, W.1. Telephone No. LANgham 2250



HEAT EXCHANGERS—long recognised as an aid to efficient industrial production—can help towards increased output and lowered costs in *your* business. Many Industries, such as Petroleum Refining and Chemical Processing are obvious users of Heat Exchangers in one form or another: important others can readily be found amongst the following:—AIR CONDITIONING · FOOD PROCESSING PAPER MAKING · POWER GENERATION · SHIPBUILDING · TEXTILE MANUFACTURE · WATER WORKS.

As licencees of the Lummus Company, Harveys can produce the Lummus "Multilok" Exchanger. Developed for high pressure, its exclusive design is not obtainable in other brands of Heat Transfer Equipment.

The skill of trained operatives, combined with extensive shop facilities and backed by Harveys experience, is at your service now. **The matter may be urgent, delay can be costly. Harveys deal with enquiries immediately.**

Harvey

INSTITUTE OF PETROLEUM REVIEW

Hon. Editor: F. H. Garner, O.B.E., Ph.D., F.R.I.C.
Hon. Associate Editor: E. B. Evans, M.Sc., Ph.D., F.R.I.C.
Editor: George Sell

No. 68 AUGUST 1952 Vol. 6

CONTENTS

THE SUMMER MEETING 277
A MOTORIST LOOKS AT THE OIL INDUSTRY. BY LORD WALERAN 281
THE OIL INDUSTRY LOOKS AHEAD. BY VERNON SMITH 287
OIL—THE TASK AHEAD. BY H. S. GIBSON, C.B.E. 294
AROUND THE BRANCHES 301
COUNCIL COMMENTARY 304
GRANGEMOUTH REFINERY EXPANSION 306
FARM TRACTORS IN UNITED KINGDOM 308
PERSONAL NOTES 309

THE SUMMER MEETING

The first post-war Summer Meeting of the Institute was held at Hastings, 27-29 June, when a total of nearly 80 members and their wives gathered together to hear three addresses on "Oil—The Task Ahead" and to enjoy the social programme. During the whole period the weather was perfect, and the magnificent bathing at Hastings was greatly appreciated by many of the guests. It was perhaps almost too hot for indoor functions, but in spite of this the addresses were well attended.

Unfortunately, Mrs Gibson was unable to accompany the President, who was supported by two Past-Presidents, Col S. J. M. Auld, O.B.E., and T. Dewhurst, two Vice-Presidents, R. B. Southall and H. C. Tett, and three Members of Council, J. S. Parker, D. L. Samuel, and O. F. Thompson, O.B.E., all of whom were accompanied by their wives. Among the overseas members who attended were Mr and Mrs L. C. Balmer (*Kuwait*), Mr and Mrs A. D. Cooper (*Egypt*), A. H. R. Grimsey (*Qatar*), Mr and Mrs S. Johnson (*Hong Kong*), and Dr and Mme Emeric Kroch and Mlle Kroch (*Belgium*).

The first of the functions was early in the evening of 27 June when the president welcomed the guests at a very informal cocktail party in the Royal Victoria Hotel. This provided an excellent opportunity for getting together, renewing old acquaintances, and for making new ones.

The business part of the meeting took place during the morning of 28 June when three addresses were given as

Discussion continued around the table during the coffee interval.

parts of the general theme of the meeting. The first was by Lord Waleran, the well-known racing motorist who was chairman of the Technical Committee on Petrol Stations set up by the Minister of Transport just after the war. The title of his contribution was "A motorist looks at the oil industry".

Following Lord Waleran, came Mr Vernon Smith of the Shell Petroleum Co Ltd, who took as his subject "The oil industry looks ahead" and by means of charts and diagrams, stressed the important place of oil in the future.

Finally, the president, Mr H. S. Gibson, O.B.E., managing director of the Iraq Petroleum and Associated Companies, told the audience what the oil industry was doing and was capable of doing in regard to "Meeting the demand".

Mr H. S. Gibson proposed a vote of thanks in turn to each of the guest speakers and at the conclusion of the meeting Mr T. Dewhurst, thanking Mr Gibson for his address, said that he had dealt with an important subject in an admirable manner. The votes of thanks were received with acclamation.

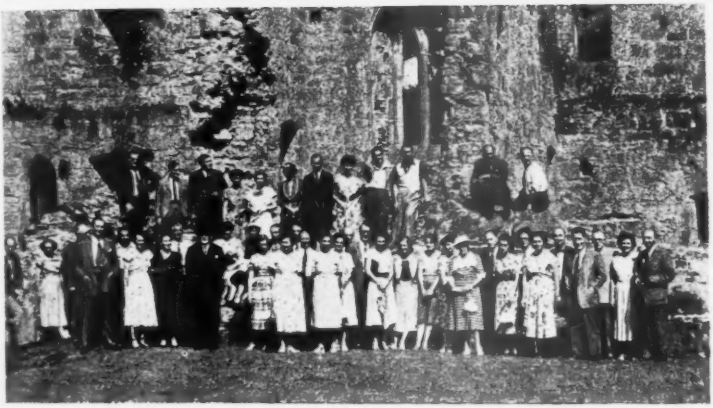
The Excursion

The afternoon of 28 June was devoted to an excursion by coach to Bodiam Castle and to Rye, and in this some forty persons participated, a few more travelling the same journey in their own cars.

This excursion was much enjoyed by all who attended. Bodiam Castle, with its moat a mass of water lilies, is probably one of the most picturesque of Britain's castles, and Rye perhaps the most intriguing of the Cinque Ports.

Among those present were (front row) Mrs A. McDougall, Mrs S. J. M. Auld, Mrs T. Dewhurst, Mrs H. Hyams, C. E. R. Sams, Mrs D. A. Hough.

AT THE SUMMER MEETING



Above the general group taken during the visit to Bodiam Castle are seen (left) F. A. J. Cole, Mlle Kroch and A. H. R. Grimsey and P. D. Doulton, (director of Matthew Hall & Co. Ltd.), with the president, H. S. Gibson. The bottom picture shows some of the party approaching the entrance to Bodiam Castle.

All Summer Meeting photos by George Sell

There are so many places of interest in Rye and the party was fortunate that the Town Clerk had very kindly arranged for the Town Hall to be open so that the maces and the museum could be inspected. Tea was taken at the Old Mermaid Hotel, which for nearly three hundred years was the headquarters of the smuggling trade with the Continent.

The Dinner-Dance

This function was held at the Royal Victoria Hotel on Saturday evening and proved very attractive. The orchestra, which incidentally had entertained the party after dinner on Friday, rose to the occasion and requests for special items were readily granted.

Golf

Sunday morning saw the golf enthusiasts setting off for St. Leonard's golf course to play a Bogey Competition, in spite of the rising temperature. After a dry spell the ground was literally as hard as concrete and the course is not an easy one at the best of times. H. E. Brown is worthy of really hearty congratulations on winning the competition with a score of four down on bogey. It was a really creditable effort. A. D. Cooper won the second prize. By the time the competition was over the "nineteenth" was a real haven of rest and much-needed refreshment.

Generalities

The meeting concluded with tea at the Royal Victoria on Sunday afternoon, although many had by then left for home in order to take advantage of a clear road before the traffic processions so typical of English main roads on Sunday had formed.

Mr H. C. Tett, a vice-president of the Institute, expressed the general opinion that the meeting had been a great success and the hope that it would be followed by more and equally enjoyable similar occasions in future years.

At the cocktail party are seen Mr and Mrs D. L. Samuel, Mrs H. Hyams, T. Dewhurst and Mrs R. F. Goldstein.

The following took part in the meeting:

Colonel & Mrs S. J. M. Auld
Mr & Mrs L. C. Balmer
Mr & Mrs H. W. Barnes
Mr & Mrs H. E. Brown
Mr F. A. J. Cole
Mr & Mrs S. J. Cook
Mr & Mrs A. D. Cooper
Dr & Mrs H. M. Davies
Mr & Mrs L. S. Davies
Mr & Mrs T. Dewhurst
Mr P. D. Doulton
Mr H. B. Fergusson
Mr & Mrs H. M. Gell
Mr H. S. Gibson
Mr G. P. Glass
Dr & Mrs R. F. Goldstein
Mr & Mrs O. H. Griffiths and Miss Griffiths
Mr A. H. R. Grimsey
Mr & Mrs D. A. Hough
Mrs H. Hyams
Mr J. C. Jewell
Mr & Mrs S. Johnson
Mr & Mrs J. B. Kay
Dr & Mme E. Kroch and Mlle Kroch
Mr & Mrs A. McDougal
Major & Mrs A. L. C. Marriott
Mr & Mrs C. W. G. Martin
Mr & Mrs D. E. Mathews and Miss Mathews
Mr G. J. O'Connell
Mr H. D. Parker
Mr & Mrs J. S. Parker
Mr & Mrs C. S. Paysant
Mr & Mrs J. Russell
Mr C. E. R. Sams
Mr & Mrs D. L. Samuel
Mr G. Sell
Mr & Mrs R. Sharp
Mr & Mrs Vernon Smith
Mr & Mrs R. B. Southall
Mr & Mrs H. W. Stevenson
Mr & Mrs H. C. Tett
Mr & Mrs O. F. Thompson
The Lord Waleran
Mr & Mrs E. C. Whiteley

A MOTORIST LOOKS AT THE OIL INDUSTRY*

By LORD WALERAN

There is still some controversy about who has the best claim to the title of the inventor of the motor car, but it is probable that the honour should go to Gottlieb Daimler and it is interesting that the first vehicle he made was not a car but a motor cycle, and then after completing a motor boat he turned to a four-wheeled vehicle. He bought a horse carriage, took off the shafts, fitted a steering gear and an upright single-cylinder 1½-h.p. engine which drove the back wheels through cogs. This was the first really successful motor car, built in 1886, and it bowled along the roads at 11 m.p.h., a rate considerable higher than our present-day progress through London's traffic. It is a curious fact that Daimler himself never seemed to visualize a vehicle built specifically as a motor car, and his manufacturing experience—cut short by an unfortunately early death—was confined to converting horse carriages to motor propulsion.

Co-operation Between the Motor and Oil Industries

Throughout the course of its development the motor industry has worked in intimate and fruitful co-operation with the oil industry. The efficiency of engines and the efficiency of fuels have progressed hand in hand. From the beginning of the serial production of motor cars, petrol very rapidly became the most important of all the many petroleum products.

Some thirty years ago the efficiency of the petrol engine was quite low and compression ratios above 4 or 4½ to 1 developed knock. Oil industry research into the causes of knock has led to better fuels and engine makers have been able to increase compression ratios to improve engine power and efficiency. Joint research by engine makers and the oil industry has resulted in the modern engine producing double the power of its predecessor of 30 years ago with a consumption of only two-thirds of the fuel per horse-power. In terms of m.p.g. there has been a 30 per cent improvement in fuel economy since 1930.

Post-War Motor Fuel

When, with the end of petrol rationing the curtain rose at last on the long-awaited era of peace time motoring it is doubly disappointing to us motorists not to have anything better in Britain than Pool spirit of 70-72 octane to put in our tanks.

While our cars continue to run on Pool petrol, engine manufacturers are prevented from using the more efficient high compression ratios and consequently from this aspect our petroleum consumption remains extravagant. Under present conditions our motor manufacturers are competing in the export markets against productions from America and other countries with their tendency to ever higher compression ratios. Already one American manufacturer has produced an experimental model with an engine of 12-1 compression ratio.

I could mention at least twenty countries in which it is possible to buy petrol with a higher octane value than we can get here. Not all these countries, as one might suppose, are those which escaped the direct impact of the last war. France and Italy, for example, can offer the motorist a spirit with an

*Summary of an address at the Summer Meeting of the IP.

octane number nearer to 80 than 70. There is even a premier grade of about 75 in Western Germany. And in Belgium, virtually our next-door neighbour, the same grade tops the 80 mark.

Government decisions on this subject must be based upon their appreciation of the country's economic problems as a whole. Yet let us not forget the technology and post-war equipment of the British oil refining industry has prepared the way towards giving the motorist the best gasolines ever offered.

The growth of the petroleum refining industry in Britain since the war has been one of the most spectacular developments in the whole of our industrial history. We now have six major refineries operating in the U.K. and a seventh is rapidly nearing completion. We are very near the time when the country will be virtually self-supporting in refining capacity. I understand that amongst the new plants now in operation or shortly to be in operation are six catalytic cracking units which are particularly designed to produce high octane gasoline. I hope they will soon be allowed to perform their designed function.

The Future

So far I have been dealing with the past but let us now take a look into the future, and especially at what the motor industry can do to give the user greater economy and perhaps, incidentally, performance. I have stressed economy because, with the present level of taxation on motor spirit in most parts of the world, I am sure that this will be foremost in the mind of the average motorist. I have mentioned already the experimental American engine of 12 to 1 compression ratio, which has a specific fuel consumption of only 75 per cent of that of a current engine operating at 7 or 7.5 to 1 compression ratio. We should not let ourselves be carried away by rosy dreams that engines of this type will shortly be finding their way into production cars. The hard facts are that a fuel of top-grade aviation quality is required to give knock-free operation at this compression ratio unless resort is had to racing type alcohol fuels which are fantastically extravagant. With existing refining techniques, it appears that at the level of top-grade premier fuels currently on sale in the United States and some other fortunate countries the oil industry has just about reached the economic optimum. Knowing its past record, I would not overlook the possibility that new processes may be developed to produce fuels of still higher performance and a reasonable price but no such processes are in sight at the present time.

What then can we look for to give us, as users, greater economy in petrol consumption? I think now we should expect greater efforts on the part of the motor manufacturers in the directions in which they, themselves, can reduce fuel consumption. I have in mind bodies of lower drag; better control of cooling air, which in present systems can waste several horse-power at high speeds; and, in particular, increased fitting of overdrives, whether fully automatic or manually controlled. At the same time, the increased power obtained from the use of higher compression ratios could well allow the fitting of engines of smaller capacity to give about the same power output as currently obtained rather than as seems to be the present practice in the United States of using each advance in compression ratio to give still higher performance by keeping the engine capacity the same. Although automatic transmissions are now extremely popular in the United States, the philosophy behind them seems to be still further simplification of the task of driving, and it is my contention that now is the time, at any rate in Europe, to content ourselves with the performance we have already

achieved and to apply these technical advances towards greater economy. Much attention has been given, especially by Continental designers of the higher priced cars, towards weight reduction, which is obviously one of the simplest methods of achieving high performance and good economy, and although many manufacturers of popular cars are adopting techniques such as unit body and chassis construction, which tend towards a reduction in weight, I am sure that more can be done in this direction.

There has been a great deal of talk recently about the gas turbine car as being the vehicle of the future and, although I would not quarrel with this if we are considering the far future, I think a few words on the likelihood of its becoming popular within, say, the next five years would not be out of place. The small gas turbine in its simplest form without any provision for heat exchange has a fuel consumption at least double that of a good conventional petrol engine for the same power output. There are broadly only two ways of improving its fuel economy: first, by fitting a heat exchanger which is a bulky device and could hardly be considered in its present form in a normal passenger car, and, secondly, by raising the turbine inlet temperature, but here we find ourselves up against the limits set by the maximum safe working temperature of present alloys used for blade materials. The materials, notably nickel, used to make these alloys are extremely expensive and are a vital part of the re-armament programme, so that they are likely to be strictly controlled for some years to come. The finished gas turbine is expensive, due not so much to its complication, for it is, in fact, a very simple piece of machinery having only two moving parts, but to the elaborate manufacturing techniques involved together with the high cost of the special materials used. I suggest that we shall see the gas turbine first coming into use in the heavy cross-country truck such as is used by the fighting services and in oilfield operations, where the major requirement is for about 500 h.p. with the minimum possible weight, and where fuel consumption is not a major consideration.

On the terrace during the coffee interval on Saturday morning at the Summer Meeting.

Considerable interest has also been aroused by the re-introduction of a diesel car by Mercedes in Germany and some may ask whether this is a likely trend. Admittedly, the diesel engine with its thermal efficiency of 35 per cent, as compared with the 25 per cent of a good petrol engine, makes better use of its fuel which is appreciably cheaper than petrol. However, it has not yet been proved possible to manufacture the fuel injection equipment—an essential part of the diesel engine—for anything like the price of the carburettor and ignition equipment of a petrol engine and present figures and experience suggest that it is most unlikely this will ever be achieved, a realistic estimate of the difference in first cost for a six cylinder engine of, say, 100 brake horse-power being of the order of £100. Consequently, it is necessary for a diesel car to cover a very large total mileage to show an economic saving.

Retail Distribution

As chairman of the Committee on Petrol Stations, I had occasion to study in detail the organization of the U.K. garage industry. During the summer of 1947 the Committee surveyed 1848 petrol stations, one in fourteen of all stations then open. The average annual through-put per station was then only 31,000 gallons against our estimated economic minimum of 40,000 for small and 70,000 gallons for large stations.

One of our main recommendations, resulting from one of our terms of reference, was that petrol stations should be divided into three grades, according to the class of road and the area in which they are situated. Stations, according to their grade, would be obliged to conform to specified standards in regard to the number of pumps and storage capacity, stocks of oil, water supply, and the hours each day and the number of days each week they would be required to serve the motorist. Grade 1 stations—those on motorways, trunk roads and Class 1 roads—would be expected to possess additional amenities, such as a hard-surfaced drive-way and forecourt, provision for refuelling under cover, an air compressor for tyre inflation, toilet accommodation, and stocks of plugs, fuses, and bulbs. In considering the need for control of petrol stations we endeavoured to view the question in its widest sense; having in mind that control does not necessarily mean licensing and that unnecessary control is fundamentally unsound. Mr Barnes, the then Minister of Transport, at whose request our committee was formed, said that to give full effect to our recommendations under this heading would mean enforcing a system of grading stations with a consequential limitation of their kind and number. For this reason, and having regard to the powers already available under the Petroleum and Planning acts, he and his colleagues had reached the conclusion that they would not be justified in asking Parliament for further powers. In other words, the report has been officially shelved.

Nevertheless, within the last eighteen months a very significant development has been taking place and one which I think every motorist must most heartily welcome. I refer, of course, to the joint action which is being undertaken by the oil industry and the garage trade to improve the standard of appearance and the service at the roadside garages in this country. I am delighted to think that a number of the objects which we had in mind in drafting our report are likely to be achieved by the unfettered action of free enterprise rather than by the methods of legislation and regulation.

Price of Motor Fuel

Possibly nothing worries the motorist so much in regard to motor fuel as the price he has to pay for it. He would be

Around Hastings at the Summer Meeting—In the left-hand column is pictured Mermaid Street, Rye, with its cobbled roadway leading up to the Old Mermaid Hotel. The centre picture shows one of the tables during the cocktail party, while at the bottom some of the guests are seen enjoying "hot dogs". Below, Mr Gibson is seen with (left) C. E. R. Sams and (right) J. S. Parker, while in the lower picture, Col. S. J. M. Auld, R. B. Southall and O. H. Griffiths have a quiet chat during the coffee break.

prepared to put up with poor quality, perhaps, or badly run service stations, if only he could buy his fuel cheaply.

At the present time there is much legitimate complaint about the cost of petrol. At 4s 3¼d a gallon it is certainly not cheap, but I am the first to recognize that the oil industry is an involuntary and unpaid tax-gatherer for the Government and that 2s 6d of the price goes to the Treasury. Moreover, I will spare the industry a word of commiseration, because I understand that they in fact finance this taxation. They have to pay in advance the Customs or Excise duty on all the motor fuel which leaves their bonded stores and they do not recover this until they have sold the fuel to the garage.

I have been looking, incidentally, at the rates of tax on petrol in other countries of the British Commonwealth and I find that, with the exception of Pakistan where the motorist is mulcted of 2s 9d a gallon, the motorist in the United Kingdom pays more to his country's exchequer than any other citizen of the Commonwealth. The tax paid in the other countries is:

Australia	9d.
Canada	11¼d.
Ceylon	1s. 11d.
India	1s. 10½d.
New Zealand	1s. 0½d.
South Africa	9d.
Southern Rhodesia	6d.

The fortunate motorist in Northern Rhodesia pays no tax at all on his fuel!

It is true that motor fuel is more expensive in several European countries than it is here, but it may give a distorted picture if the taxation of motor spirit is considered without other forms of taxation on the road user. In France, for example, although motor fuel costs 5s 7d a gallon (ordinary) and 6s 0d a gallon (premium), there is no vehicle taxation but only a nominal registration fee.

Road Construction

The construction and maintenance of roads is, of course, another field in which the oil industry plays its part. Bitumen and asphalt have been used since the early motoring days and continue to be used in ever increasing quantities as media for the binding of road surface material.

I only wish that a great deal more of your material could be applied to the maintenance and improvement of our roads. But, alas, there seems to be no relation whatsoever between the expenditure on roads and the enormous contributions made by commerce and the motoring public to the Treasury. In the six years ending 31 March 1953 well over £1,000 million will have been paid in motor taxation—that is to say fuel tax, licence duties, and purchase tax—yet against this vast amount no more than £165 million will have been allocated to our motor roads.

During this period of economic stringency no better investment could have been made to increase our national productivity than by improving our roads. Such expenditure would produce a quicker and richer dividend than an equal expenditure by almost any of the major industrial users of capital today. Our savings in man hours, equipment, and resources would have paid a quick and handsome dividend. There has been a tendency to view an increase in productivity as possible only through improvements in manufacturing technique. But what is the use of installing expensive modern machinery in factories, embarking on time and motion studies, and so on, if the distribution of the products by road out of the factories is hopelessly out of date?

Conclusion

I am sure I am speaking for all my fellow motorists when I say that you have done us well. You have given us

the best that the skill and know-how of your scientists and technicians could provide and, as I have said, you are ready and anxious to give us quality fuels once again.

You have given us your products at a reasonable price. I cannot assess the many factors that contribute towards the price structure of your world wide industry, but in a world of constant rising prices your demands upon the motorist appear to remain conservative.

Through your latest venture, your liaison with the garage industry, you are doing much in giving us better attention, service, and amenities which add so much to the pleasure of motoring.

Britain's oil industry, although Britain has only an infinitesimal quantity of oil of its own and although there are only modest quantities within the Commonwealth, has built up an impressive share of international trade.

★ ★ ★

THE OIL INDUSTRY LOOKS AHEAD*

By VERNON SMITH

The Importance of the Oil Industry in the Modern World

If the oil consumption of the world continues to grow at the same speed as during the last 15 years, an annual production of 1200 million tons of crude oil will be needed in 1967—twice today's production. The exuberant vitality of the industry is shown in the rapidity with which the losses and destruction of war have been more than recovered in record time; its resilience is proved by its power to adapt itself smoothly to changing circumstances—witness the manner in which the crisis created by the closing down of the Persian production and the Abadan refinery was resolved with a minimum of dislocation. With such past and present records of achievement, the oil industry is well equipped to face with confidence the task ahead.

The task ahead may be briefly summarized. It involves the assurance of adequate production to meet the expectation of a continued rise in demand; sufficient refinery capacity must be available to turn out finished products in proportion to, and in the quality needed by the market; the tanker fleets must be built up to ensure without any hitch the transportation of oil from production areas to every part of the world; distribution facilities must be extended and, wherever necessary, modernized to supply the consumer with the required products by the most efficient means.

The Growing Use of Oil

Increasing production, whether industrial or agricultural, postulates ample supplies of energy in all its forms. The main sources of energy are coal, oil, natural gas, and hydro-electricity. For generations coal has been the world's chief source of energy. But the coal industry has been unable to make any major increases in production, since the peak of its development early in the century, and despite a rapid increase

*An address at the Summer Meeting of the IP

in world energy requirements. The changing importance of the main sources of energy can clearly be seen in Fig. 1 which shows how the different kinds of energy, coal and lignite, crude oil and natural gasoline, natural gas, and hydro-electricity have contributed to a growing volume of total world energy supplies.

demand and inadequate coal production. Indeed, it was the oil industry which saved the situation and which was responsible for enabling this big increase in industrial activity to take place. *Without the oil industry, the present high figure for production in Western Europe could never have been achieved.*

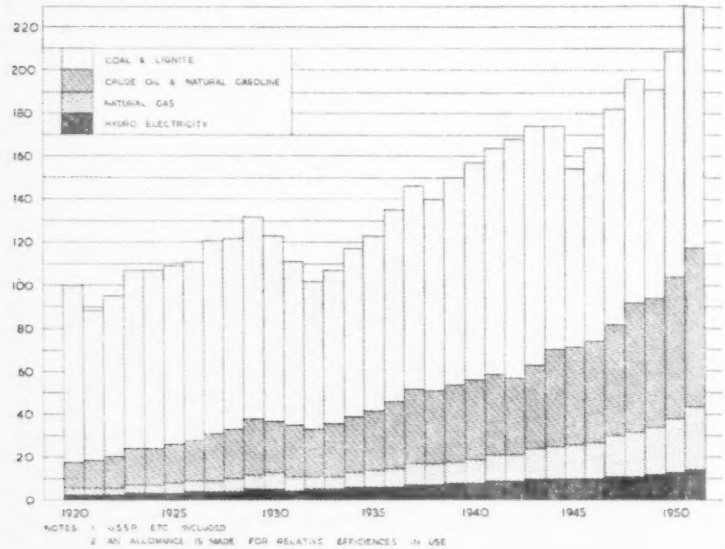


Fig. 1. The changing pattern of world energy supplies. Indices (1920 = 100).

If the index figures on the chart are converted into percentages, the following picture emerges. In 1920, oil and natural gas together supplied only 15 per cent of the world's energy supplies, compared with 83 per cent supplied by coal and lignite. But by 1951, oil and natural gas supplied 45 per cent, almost as much as the proportion supplied by coal and lignite which had fallen to under 50 per cent. In Western Europe, where industrial production in 1951 was over one third higher than in 1938, oil helped to fill the gap between energy

The Growth of World Oil Production

The growing role of oil as a source of energy has been accompanied by a large-scale expansion of the oil industry's operations. Although the world has many producing areas which individually are highly important, three main geographical areas, namely the U.S.A., the Caribbean, and the Middle East, provide the bulk of world oil supplies and it is to these areas that we must chiefly look for supplies adequate to meet the additional demand for oil products in the years ahead. Fig. 2

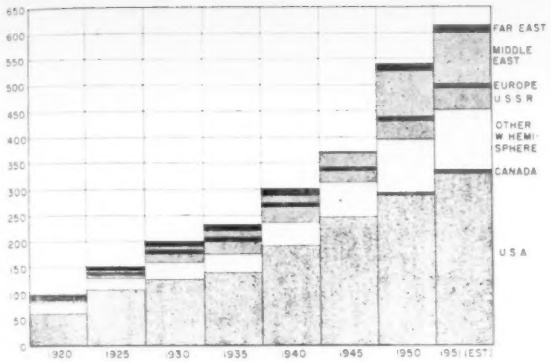


Fig. 2. The growth of world oil production (Million metric tons).

shows the growth of world crude oil production since the first world war. In the 30 odd years since 1920, world oil production has increased sixfold from 100 million tons in 1920 to over 600 million tons in 1951.

Fig. 2 also shows the growth of oil production in the major producing areas. The rapid increase in production from the Middle East from 1945 onwards is particularly noteworthy. A large post-war increase in production has also taken place in the U.S.A. and elsewhere in the Western Hemisphere.

The U.S.A., however, has recently become a net oil importer. It is in fact having to import increasing quantities of crude and fuel oil from outside sources, notably from the other Western Hemisphere producers, particularly from Venezuela. Thus, the Western and Eastern Hemispheres are evidently becoming increasingly self-sufficient in oil. More of its own oil is being used within the Western Hemisphere and the Eastern Hemisphere is coming to rely on its own production for a large proportion of its supplies.

Fig. 2 also shows, however, that in spite of the notable discoveries of oil deposits in Western Europe since the war, European oil production is well-nigh negligible compared with world production as a whole. In these circumstances, Western Europe is coming to depend more and more on oil from the Middle East.

Sources of Future Oil Supplies

Fig. 3 showing the change in the sources of West European oil supplies between 1938 and 1951, suggests that already Western European supplies are largely derived from this source.

In 1938, 19 per cent of Western Europe's oil supplies came from the Middle East. By 1951 the figure had risen to about 70 per cent.

This change in the sources of Western Europe's oil supplies between 1938 and 1951 has been accompanied by a change in the composition of Western Europe's oil imports which now contain a much higher proportion of crude oil than hitherto. This change is the consequence of the great increase in refinery capacity in Western Europe since the war. Thus, for example, the crude oil capacity of U.K. refineries is expected to increase from some 4½ million tons at the end of 1948 to about 26 million tons at the end of 1953. For Western

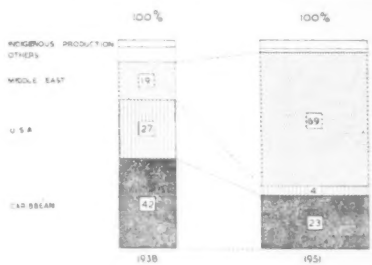


Fig. 3. Sources of West European oil supplies (percentages).

Europe as a whole, refinery capacity is scheduled to rise to 90 million tons, compared with less than 20 million tons pre-war.

The Changed Pattern of World Oil Consumption

These changes in world oil movements have been accompanied by a significant change in the pattern of world oil consumption. This has not been very marked in the U.S.A. but in the world outside the U.S.A. and the Soviet sphere, as can be seen from Fig. 4, the pattern of consumption changed in a very striking manner between 1938 and 1951.

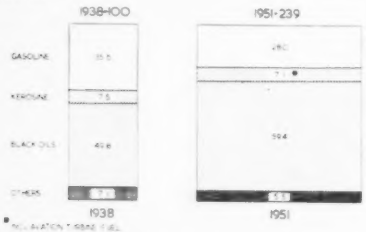


Fig. 4. The pattern of world oil consumption, excluding U.S.A. and Soviet sphere. (Figures in percentages.)

The large figures at the top of the chart indicate that in 1951 oil consumption in the world outside the U.S. and excluding the Soviet sphere was almost two and a half times the consumption in 1938. The smaller figures inside the columns reveal the striking fact that, over the period, the relative importance of the gas/diesel and fuel oils increased from 50 per cent to nearly 60 per cent of consumption in the area.

The Outlook for the Future

Future Demand

In this context, and assuming no major deterioration in the world political or economic situation, a considerable expansion in the world demand for oil is a certainty. There is strong evidence for the view that the consumption of oil in the world outside the U.S. and the Soviet sphere may rise by over one-third above the 1951 level by the end of 1956. Moreover, by 1956, the demand for oil products in the U.S.A. may be as much as one-fifth more than in 1951. These figures suggest that possible increases in the world demand for oil, even in the more immediate future, may be very large indeed.

And there are many reasons why this substantial and healthy expansion in the demand for oil should take place. Experience has shown that the growth of the world's population, the trend towards higher living standards and the need to produce more food must tend towards an increasing world consumption of oil.

The growing number of mouths to feed makes the increasing mechanization of agriculture an urgent necessity and stimulates a corresponding increase in the need for the tractor fuels. Today there are some seven million tractors at work in the world. Of these seven million tractors, no less than $5\frac{1}{2}$ million are in four countries only, the U.S.A., Canada, the U.K., and the U.S.S.R. In the whole of Latin America, Asia (excluding Russia) and Africa there are only some 350,000 tractors, or barely 5 per cent of the total. There is therefore enormous scope for the increased "tractorization" which must be undertaken if the world's food problem is to be solved. And it must not be forgotten the need for fertilizers and other chemical aids to agriculture in which the oil industry comes in again thanks to the petrol-chemical industry.

Oil is a growing necessity in the modern world and Fig. 5 shows the huge potential markets which exist for oil products in the long run as economic development proceeds in the less developed countries of the world. It shows that there is a marked disparity between oil consumption *per capita* in the highly developed and underdeveloped parts of the world. Thus, in 1950, the consumption of petroleum products in the U.S.A. and Canada was

Fig. 5. Per capita consumption of petroleum products 1950 (Imp. gal. per head).

520 Imp. gal. per head, compared with only 2 Imp. gal. per head in India and Pakistan.

Individual Products

If the main oil products are considered individually, a little more detail of some of the main factors which seem likely to affect the future task of the oil industry can be seen.

Motor Spirit.—The demand for motor spirit follows the upward course dictated by the growing importance of the road vehicle. The difficulties the railways are experiencing in most countries to carry their share of the increasing burden of traffic has increased the need for road transport in all its forms. Moreover, in many countries the construction of an adequate road network is being accorded the highest priority.

Aviation Fuels.—The skyways of the world are becoming no less important than roads and sea-routes in providing the essential sinews of trade. The big increase in air travel last year seems likely to receive added momentum from the introduction of low-cost fares. Capable of spanning the world's main oceans and continents at speeds which man dared not contemplate less than 25 years ago, the modern aircraft is shattering many of the barriers which hitherto have separated peoples of different creeds and colours.

Black Oils.—A continuous improvement in diesel engines, both high- and low-speed, is resulting in their being increasingly favoured for road and rail transport. In the U.S.A. the steam locomotive is rapidly becoming a thing of the past and extensive conversion to diesel rail traction may be expected in other countries as time goes on. It is a striking fact that, although in calorific value it takes five barrels of oil to equal a ton of coal, on railway traction one barrel of oil will do the same work as a ton of coal.

There is also a growing appreciation of the industrial uses of fuel oil, particularly in certain industries such as the steel industry, where it has notable technical advantages, although, of course, to some degree, world consumption of black oils outside the

U.S.A. has been stimulated in post-war years by the coal shortage.

The growing use of oil as a source of energy is illustrated in Fig. 6, which shows the growth in the tonnage of world merchant shipping from 1914 to 1950 and the types of fuel from which the ships concerned derived their motive power.

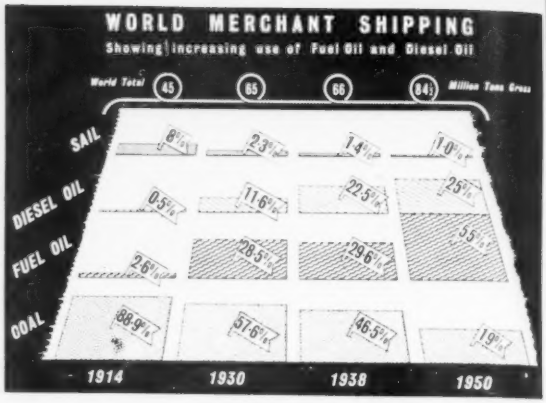


Fig. 6.

It will be seen that in 1914 a little under 90 per cent of world merchant shipping was coal-fired and only 3 per cent was fuelled by diesel and fuel oil. By 1950, when there was a total tonnage nearly twice as large as in 1914, coal's contribution had fallen from 90 to 19 per cent and oil's contribution had risen from 3 to 80 per cent.

Petro-Chemicals

A new field of operation for the oil industry has been opened up with the development over the last two decades of a new chemical industry based on petroleum. Almost overnight, oil has become a vast chemical store-house.

Fig. 7 shows the development of the organic chemical industry in the U.S.A. between 1925 and 1945. Over these twenty years, the total annual production of the U.S. organic chemical industry increased from 450 *thousand* tons to some 7½ *million* tons. In 1925, the production of chemicals derived from petroleum was negligible but by 1945 over 30 per cent was petroleum based. Moreover, the director of the U.S. National Production Authority's Chemical Division has recently emphasized the tremendous development of oil as a raw material for chemical production and has stated that in 1950 as much as 60 per cent of organic chemicals produced in the U.S.A. was derived directly or indirectly from petroleum raw materials. While the petro-chemical industry was born in the States, it has more recently begun to develop elsewhere, and chemicals from petroleum are now being produced in Britain as well as in other parts of Western Europe.

Future Expansion of the Oil Industry

The widening horizons of the future demand for oil products as a whole may well require unprecedented increases in oil industry operations.

The tanker position and refining requirements illustrate the problems involved. Fig. 8 shows the growth of the world tanker fleet since before the

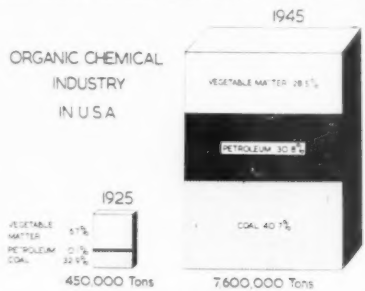


Fig. 7.

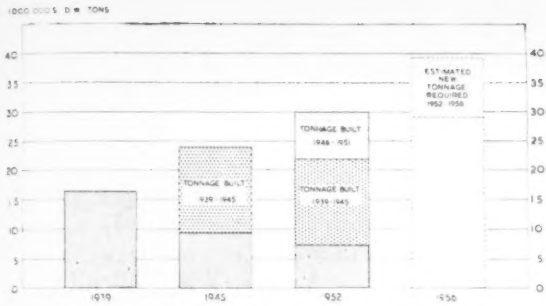


Fig. 8. World tanker fleet.

war and estimated new tonnage required in the next five years.

It will be seen that at the beginning of this year the world tanker fleet totalled some 30 million deadweight tons, or about double the pre-war tonnage, and it has been estimated that by 1956 another 10 million tons will have to be constructed to carry the increasing volume of oil moving in world trade. The shipyards of the U.K. are now largely geared to an impressive series of orders for tankers, the majority of which are large capacity vessels. Tankers with a deadweight capacity of 28,000 tons and more are becoming a commonplace. Vessels as large as 40,000 tons are on order.

Refinery construction programmes are equally impressive. A large post-war expansion programme has raised refining capacity in the U.S. from about 320 million tons at the end of 1948 to about 360 million tons at the end of 1951 and a further 40 million tons of capacity is planned for construction by 1954. Outside the U.S.A. and the Soviet sphere the expansion has been proportionately far greater. Over 80 million tons of new refinery capacity was built between 1948 and 1951 and another 65 million tons is planned for completion by 1954, much of which is actually in course of erection.

It is possible, therefore, that the increase in world demand for oil products may necessitate an overall expansion of well over 100 million tons of refining capacity in the next five or six years.

Conclusion

It is hoped that this somewhat sketchy and imperfect survey of the important tasks that the oil industry will be called upon to carry out will have at least left no doubt of the vital urgency of the work being done to promote world development. The survey dealt with concrete, tangible problems but beyond the industry's buoyant enterprise and technical skill there is the paramount necessity to do everything possible to maintain the friendliest and most intimate understanding with the many peoples with which we work.

This calls for statesmanship of the highest order and is a task ahead for the oil industry even more important than all the others which it has faced and will face with confident assurance of success.

★ ★ ★

SIR JOHN CASS COLLEGE

Reporting for the year 1950-1, the Principal of the Sir John Cass College noted that the special lecture courses included 19 lectures on General Technology of Petroleum with 162 students, 5 lectures on Oil Storage, Transportation, and Distribution with 197 students, 7 lectures on Petroleum Refinery Practice with 83 students, and 10 lectures on Distillation with 103 students enrolled.

W. S. Ault, F.Inst.Pet., and C. S. Windebank, F.Inst.Pet., have joined the Consultative Committee on Petroleum.

OIL—THE TASK AHEAD*

By H. S. GIBSON, C.B.E., M.A. (President)

Meeting the Demand

The Magnitude of the Demand and the Reserves Available to Meet it

We have heard from the previous speakers of the enormous extent to which the world is today dependent on petroleum, and of the very large and still growing quantities that are required. The problem of meeting this demand centres on its magnitude and the amount and location of the world's reserves of crude oil.

The world's proved reserves in 1951 were given in a paper presented to this Institute in May by Dr G. M. Lees and Mr D. C. Ion as follows:—

	Millions of tons	*Percentage of total*
N. America	4,520	31
S. America	1,620	11
Middle East	6,900	48
East Indies	240	2
Russia	1,000	7
Others	170	1

These authors then proceeded with some boldness to give estimates of the additional reserves they anticipated might be discovered in the next twenty years, and the consumption of crude oil in the same period. Their figures were:—

Total oil available up to 1972

	Millions of tons	*Percentage of total*
N. America	10,000	24
S. America	5,000	12
Middle East	20,000	49
East Indies	1,000	2.5
Russia	4,000	10
Others	1,000	2.5

*An address delivered at the Summer Meeting of the IP.

The consumption of crude oil is at present running at about 600 million tons a year, and Lees and Ion estimated that it will increase geometrically by some four or five per cent per annum, so that the total requirements from 1952 to 1972 will be about 19,000 million tons. Thus, while in 1952 the proved reserves are about twenty-four times the annual consumption, on their estimates, in 1972 the proved reserves will be about sixteen times the annual consumption at that time.

The final conclusion of these authors was that in the circumstances which will arise in the next twenty years, it is possible, even probable, that the amount of oil obtained from solid sources (coal and oil shale) will increase progressively.

The remark on the boldness of Dr Lees and Mr Ion in giving estimates of additional reserves to be anticipated in the next twenty years was made because several such estimates have been made in the last forty years or so. Those estimates which painted a gloomy outlook—and they were not infrequent—have been proved by events to be wrong, and there is now a widespread reluctance, especially in the U.S.A., to consider even the possibility of a world shortage of petroleum. There is a belief that even though consumption is rising to very high figures, the necessary reserves will continue to be found.

I am not competent to comment on the estimates put forward by Lees and Ion for the discovery of reserves in the next twenty years, but I am inclined to question their estimate of consumption in that period. Over the last sixty years, the increase in the rate of consumption has been at a compound interest rate of 6.6 per cent per annum. In other words, consumption has approximately doubled every twelve years. This is rather remarkable, considering that

sixty years ago we were in the "Lamp Oil Age" and the internal combustion engine was barely in existence, and that in this period we have had two world wars. If this rate of increase persists for the next twenty years (and there seems to be no reason why it should not when we consider the very high *per capita* consumption in the U.S.A. and the low consumption over the remainder of the world), the total consumption during the next twenty years will be about 24,000 million tons instead of 19,000. The proved reserves in 1972 would then be only nine times the annual consumption instead of sixteen. This would be a very low working margin of reserves.

Turning now to look at the present distribution of production, we find that over 50 per cent comes from the U.S.A. although that country possesses only 30 per cent of the reserves. The U.S.A. is drawing upon its proved reserves at a greater rate than any other producing area; the Western hemisphere with 42 per cent of the present proved reserves is producing approximately 70 per cent of the total production. The Middle East with 48 per cent of the proved reserves is producing 16 per cent of the world consumption.

In Russia production is apparently about 7 per cent of the world total, and as its proved reserves are also estimated at 7 per cent it is more or less in balance and need not be further considered.

There are thus two major producing areas in the world, the Western hemisphere where production is at a rate well above its proportion of reserves, and the Middle East where the production is below its proportion of reserves.

This situation was beginning to be apparent in 1944, for DeGolyer, the leader of the United States Petroleum Commission to the Middle East in that year said "the centre of gravity of world oil production is shifting from the Gulf-Caribbean Area to the Middle East, and is likely to continue to shift until it is firmly established in that area."

Presumably the firm establishment of the centre of gravity in the Middle East visualized by DeGolyer will be accomplished when the production there is in proportion to the reserves, and at the present rate of shift that is going to take some time.

It is a logical thought that oil should be drawn from each producing area in proportion to the reserves in that area. It is unlikely, however, that this will be done, and there may be certain advantages in not doing so.

As I have said before, I am not competent to comment on the figures given by Lees and Ion for the amount of oil that may be discovered in the next twenty years, but the situation they envisage when an increased amount of liquid fuels is obtained from solid sources must come sooner or later. Petroleum reserves are clearly not of the same order as those of coal, and the curves of consumption with its continuous rapid increase and total remaining reserves whatever they may be, are approaching each other at an increasing "closing speed". Both DeGolyer and Lees believe that the reserves of the Western hemisphere are less than those of the Middle East, so while a proportionately greater part of production continues to be drawn from the former, a shortage of oil will first appear in that area, and will appear sooner than if the Middle East carried its full share of the load.

There need be no fear that such a shortage, if and when it comes, will appear suddenly. The tapering off of new discoveries in the U.S.A. will cause increased production from other areas able to supply it and bring economic factors into play which will stimulate other sources of supply, e.g., the conversion of natural gas into liquid fuel by catalytic processes. Egloff has estimated that the complete conversion of natural gas reserves to liquid fuels

would increase the known reserves of oil by approximately 50 per cent.

The Technical Aspects of Further Increases in Production from the Middle East

Having examined the magnitude of the demand and the possible reserves available to meet it, we see that the Middle East will be called upon to supply an increasing amount of the world's requirements of petroleum.

There are no technical reasons why this increase should not be achieved. In many parts of the Middle East there is an embarrassment of riches in the form of visible anticlinal structures apparently suitable for the accumulation of oil and awaiting test, but some of the results of post-war exploration suggest that the spectacular discoveries of the pre-war years may not be repeated. The U.S.A. has for many years maintained its position as the leading oil producer by the intensive application of all methods of prospecting, including geophysics, structure drilling, and drilling to greater depths. All these methods are now being successfully applied in the Middle East. The Zubair field in Southern Iraq was located entirely by geophysical methods, and its producing horizon is more than 10,000 ft below the surface, making it one of the deepest producing fields in the world today. In the Arabian peninsula, geophysical methods have largely failed and structure drilling has been the successful method employed. As in the U.S.A. these modern methods of exploration will yield valuable results, but as time goes on the intensity of search will have to be increased to maintain the required rate of discovery.

The greater depth at which new reserves will be found will bring with it the problem of the disposal of the natural gas which accompanies the crude. In some cases, but not all, this gas can be recycled to reservoir with the advantage of improvement in the amount of oil extracted, but there will remain the problem of disposing of the remainder. At present the amount of gas produced in the Middle East is relatively small, but a stage may soon be reached when 15 per cent by weight of the fluid extracted from the earth may be gas. On this basis a natural gas production of some 5,000 million cubic feet per day is well within the bounds of possibility. As there is no market for gas in the Middle East as there is in the U.S.A. various suggestions have been made for dealing with it; one proposal is to build a 34/36-inch diameter pipeline to carry 500 million cubic feet per day to Western Europe; another is to liquefy gas at or near seaboard and ship it as a liquid in specially insulated tankers. Perhaps the most likely process would be to convert the gas to liquid fuel by catalytic process. In his Cadman Memorial Lecture before this Institute in 1947, R. P. Russell estimated that it would cost about £7,600,000 to build a plant in the United States to produce 420,000 tons per annum of liquid fuel from natural gas, which is equal to about £18 per ton of annual capacity. This was about twice the cost of a complete refinery capable of producing the same products from crude oil. Of the 420,000 tons, approximately 380,000 tons would be 80 octane motor spirit and 40,000 tons would be gas oil. Plant construction and operating costs in the Middle East are appreciably higher than in the U.S.A. but it would not need a very big increase in crude oil values to bring this process within economic reach.

The production of crude in the Middle East has received a considerable impetus from the development of large diameter pipelines, which make the transportation of oil to the Eastern Mediterranean coast an economic proposition and allows Middle Eastern oil to compete in Western Europe with Western Hemisphere oil.

Two of these large diameter lines have been completed, the first from Saudi Arabia to Sidon, and the second from Kirkuk in Northern Iraq to Banias. The latter is for the time being the largest diameter crude trunk line in use, and consists of 30- and 32-inch diameter pipe, but larger diameter lines are being planned and it is safe to predict that 36-inch diameter pipelines will be built in the reasonably near future. Pipe of this diameter has already been used in the U.S.A. for the transmission of natural gas.

In the design of large diameter pipelines, the long established numerical factor of safety has been superseded by a unit stress related to the yield strength of the steel from which the pipe is made. Protection against the corrosion of buried pipelines in the shape of improved coatings and cathodic protection has eliminated the need for additional thickness in the wall of the pipe as a corrosion allowance. Where conditions allow, wall thicknesses are varied with working pressures. These three points in design have reduced the amount of steel required very considerably.

The development of large diameter pipelines has also seen the adoption of large centrifugal pumps to handle the oil. Individual pumps of 2000 bhp and over are used on these pipelines, and a pumping station frequently contains a total of ten to twelve thousand horse-power in prime movers.

The use of large diameter pipelines is now firmly established, and their installation presents no serious problems. The various operations in their construction, that is ditching, stringing, welding, cleaning and wrapping, lowering into the ditch, and backfilling, all lend themselves to production line methods, and they can be so planned to follow one another in close succession at speeds seldom below and mostly above the rate of one mile per day per gang. Even the testing of the pipeline can be added at the same time to these operations. In the past, with small diameter lines, it was the custom to fill the completed pipeline with water and subject it to a pressure test. Experience on the IPC 30/32-inch-line has demonstrated that it is possible by careful inspection, using the most modern methods, to detect practically all faults in the steel of the pipe and in the welding before the protective covering is applied, and so dispense with a water test. As soon as it is completed, the pipeline can be safely filled and pressurized with the oil it is to carry. The additional cost of inspection is more than covered by the time saved, besides having the advantage that it avoids the risk of possible initiation of internal corrosion and the difficulty of completely removing water from the pipeline.

From this brief review of the technical aspects of increasing the amount of petroleum in the Middle East, the difference in pattern from operations in the U.S.A. may have been noticed. In the U.S.A. a relatively large number of small companies are engaged in the industry, whereas in the Middle East operations can only be carried out by organizations with large capital resources. The reason for this is that in the U.S.A. a company or individual may need to invest little more than the cost of a single well to become a producer, whereas in the Middle East an investment of the order of £20 million may be necessary before a production can begin. The construction of a large diameter pipeline to the Mediterranean costs more than twice this amount. Although, therefore, there are no technical reasons why production from the Middle East cannot be increased, it does demand capital investment on a large scale.

The Social and Economic Problems of the Middle Eastern Producing Countries

The rapid increase in the rate of production in the Middle East in recent years has had considerable social and economic effects in the countries

concerned, and the impact of further increases will undoubtedly raise many problems which will not be easy to solve.

The first, and for many years the leading producing country was Persia, a country of ancient culture and tradition which has maintained its independence in spite of invasions and threats of invasion over many centuries. The details of the present dispute are well known to everyone and there is no need to enter into discussion of that subject here.

The second country in which petroleum was found is Iraq, a country with a population numbering about five millions and where production is now increasing rapidly, not only from the original field at Kirkuk in the north, but also from the newly discovered Zubair field in the south. Under the agreement recently concluded with the Iraq Petroleum Company and its associated companies, Iraq receives half of the profits arising from the operations within its borders, this being now the more or less standard arrangement in the producing countries of the Middle East. The result is that these countries are receiving very large incomes from their oil industries, amounting in some cases to as much as £50 million a year. In all cases these royalties amount to considerably more than the previous total revenue. Besides these payments, there are also the amounts spent by the oil companies on wages and local services to be taken into account when considering the effect on the economy of the producing country. In Iraq the income arising from the petroleum industry is being very wisely used; it is realized that petroleum is a capital asset which, although very large in extent, must come to an end some day, and that the correct policy is to use the income from oil to create more useful capital assets which the country will still possess when the oil is finished. Oil in the ground is a non-productive capital asset, but an irrigation system is a productive capital asset. That illustrates the policy of the Government of Iraq. A Development Board has been set up which receives 70 per cent of the income derived from petroleum. With this money it is developing the other natural resources of the country. Iraq possesses large areas of fertile soil where the rainfall is insufficient to support agriculture. She also possesses two large rivers, the Tigris and Euphrates which carry enormous volumes of water in the spring from the melting snow on the mountains in the north. Frequently these rivers overflow their banks and there are disastrous floods. The first schemes of the Development Board are therefore concerned with flood control and irrigation, by which large areas of fertile land will be brought into cultivation as a permanent wealth-producing asset. Other items under consideration are the raising of the standards of agriculture, the afforestation of suitable areas, exploration for copper, iron, zinc, chrome, and salt deposits and the development of transport and communications.

The remaining 30 per cent is used to bring some immediate benefit to the people of Iraq by expanding the social services of the country and reducing taxation.

Iraq is fortunate in possessing natural resources which can be developed in this way, but in the other producing countries, particularly the smaller sheikhdoms of the Persian Gulf, the situation is far different. Part of the income from oil is being spent on schools, hospitals, medical services, water supplies, and all things required to raise the standard of living of their populations. There the problem is to find investments in the development of natural resources, but the only natural resource available appears to be the Persian Gulf itself. This is one of the richest fishing areas in the world and, except for pearl fishing, has never been developed in any way, but

it could only absorb a very small portion of the money which is flowing to that area. The problem is a very serious one; the populations are small and have been more or less static in numbers for centuries; with the improvement in the standard of living, these populations will increase rapidly. Ultimately, all the oil will be produced, and unless an alternative source of income is then available, the populations will be unable to support themselves. Emigration will be the only solution, and investment of a part of the present income towards this end could be a valuable insurance for the future.

It can be seen that the production of 100 million tons of petroleum per annum from the Middle East is raising many problems. If production is considerably increased, and it certainly will be, it is impossible to imagine what the result will be. It is to be hoped that some at least of the problems which have been indicated will have been solved before the increase takes place, otherwise its impact may very seriously dislocate the simple economic and social structures of these producing areas.

To summarize briefly, the demand for oil can be met for some years to come from the existing and anticipated reserves of petroleum, but for how many years we cannot say. It is probable that the Middle East will become the major producing area of the world, with an offtake which may amount to several times what it is at present within the next twenty years.

It is possible that the U.S.A. may be the first producing area to feel the effect of dwindling reserves in which case it will also be the first to turn active attention to the development of supplies from solid sources. For the world as a whole, this would certainly be the best arrangement, for the U.S.A. with its resources, knowledge and energy would be able to deal with the problem better than any other country.

While the technical problems involved in a large expansion of offtake from the Middle East are all capable of solution, the impact of this expansion may cause serious economic and social difficulties. The solution of these difficulties will depend on our ability to develop and maintain sound economic and social relationships with the Governments and peoples of the countries where the reserves of petroleum are located. The new profit-sharing agreements with these countries provide a basis for the development of such relationships, but they can only yield maximum benefits to both parties if there is a constant recognition and strengthening of the community of interest between them.

★ ★ ★

Around the fountain on the verandah of the Royal Victoria Hotel, Hastings, during the IP Summer Meeting.

THE DINNER/DANCE AT HASTINGS

Left to right are— J. S. Parker, Mrs H. E. Brown, H. W. Barnes, Mrs J. S. Parker, H. E. Brown and Mrs H. W. Barnes.

In the top row are seen (left) the President with Col. and Mrs Auld, and (right) Mr and Mrs H. C. Tett with H. D. Parker. Below (left) are D. L. Samuel, Mr and Mrs H. W. Stevenson, Mrs D. L. Samuel, and Mr and Mrs C. W. G. Martin, and (right) Miss Griffiths, F. A. J. Cole, and Mr and Mrs O. H. Griffiths.

AROUND THE BRANCHES

Stanlow Branch

The Stanlow Branch have arranged a very interesting programme for 1952/3 session. Opening on 15 October, their first meeting will be an address by the President of the Institute, H. S. Gibson, C.B.E., who will talk on the Kirkuk-Banias pipeline. Refinery problems will be dealt with at two meetings; K. Owen is to talk on "Modern methods of motor gasoline manufacture" (23 October at Empire Cafe, Morecambe), and E. S. Sellers will discuss "Some problems of 'scaling-up'" at a joint meeting with the Royal Institute of Chemistry on 17 December. A second joint meeting with the Royal Institute of Chemistry will be held on 5 March when C. A. McDowell will talk on "Some chemical applications of mass spectrometry," and a joint meeting with the Royal Aeronautical Society on 18 November will hear a paper on "Soaring flight" by W. E. Crease. E. A. Evans, past president of the IP will talk on "Lubrication—chemist or engineer?" on 18 March and S. J. Young will discuss "Methane at Point of Ayr colliery" on 18 February, when the meeting will be a joint one with the Institute of Fuel. The usual Sunday scientific film show will be on 1 March. On 20 January the Annual General Meeting will be followed by "Any questions?" and on 28 November the annual dinner and dance will be held at Thornton Research Centre.

Except when otherwise stated, the meetings will be held at the Grosvenor Hotel, Chester, with the film show at the Tatler Theatre, Chester.

London Branch

A party of seventy members visited

Photo by C. J. Taylor

The London Branch at Fawley.

Fawley refinery on 21 June, leaving London by train in reserved dining car coaches and taking breakfast en route. Motor coaches, provided by the Esso Petroleum Co met the train at Southampton and conveyed the party to the refinery, which was reached at 10.30 a.m. Mr C. R. Young, public relations manager at Fawley, in welcoming the party, introduced the day's programme with a general talk well illustrated by a map of the refinery and surrounding area, and also showed a film entitled "Let Go For'ard", which gave an interesting idea of the movements of a modern tanker and the life and work of the crew.

The party then divided into two groups with Mr Young and Mr I. McCallum, honorary secretary of the IP Fawley Branch, as guides. One party toured the refinery by coach, while the other visited a tanker at the impressive new marine terminal.

The parties were then taken to the Westcliff Hall Hotel at Hythe where an excellent lunch was provided by the hosts. After lunch A. W. Deller, chairman of the London Branch, expressed thanks to the directors of Esso, to G. Noble, O.B.E., general manager of the refinery (who was unfortunately unable to be present), to Mr Young, to Mr McCallum, and to all the other officials who had been responsible for the faultless arrangements.

The parties then changed places for the afternoon, one touring the refinery while the other visited the tanker, finally getting together for an excellent tea in the refinery canteen. A quiet hour was then enjoyed at the Esso Recreation Club, watching cricket, playing snooker, or at the bar.

The very full day was much appreciated by members, the refinery impressing everyone by appearing, in actuality, to be just as cleanly and efficiently laid out as has been described in the press.

NEW OIL LEASE SIGNED IN SARAWAK

A new oil mining lease between the Government of Sarawak and Sarawak Oilfields Limited was signed at Kuching on 23 June by the Officer Administering the Government, R. G. Aikman and the Company's general manager, R. E. Hales.

The concession held by Sarawak Oilfields goes back to an indenture dated 9 March 1909, by which exclusive oil rights over the whole of Sarawak were granted to the Anglo-Saxon Petroleum Co Ltd. Provided oil was found, the Company was to be entitled to a lease extending to 1999. Royalty under this indenture was fixed at 1s per ton of oil with a minimum royalty of £2000 per year. The Company was specifically exempted from payment of customs duty on materials imported for the enterprise. By supplementary agreements in 1921 and 1923, the Company accepted an increase in royalty rate to 2s 6d per ton and agreed to pay £5000 per year in lieu of income-tax, and was exempted from such taxation should it in future be introduced in Sarawak.

Under the new agreement the Company has agreed to surrender 25 per cent of the land area of Sarawak after five years, a further 25 per cent after ten years, and to reduce the area to 25 per cent of the Colony after 15 years. The Company is to pay a percentage royalty based on the value of the oil obtained. Royalty on casinghead spirit and natural gas sold has been introduced for the first time and the minimum royalty raised to £10,000 per year

Under the new lease the Company also undertakes to spend £50,000 per year on exploration or oil mining operations whenever production is less than 40,000 tons per year. The Company is at present spending larger sums, although the production from its Miri oilfields is more than 40,000 tons. The Company also agreed to accept liability for the recently introduced income-tax.

GOLF AT THE SUMMER MEETING

To the left are seen J. S. Parker, G. P. Glass, H. E. Brown, H. W. Barnes and A. D. Cooper, taking it easy on the sixth tee.

Above are seen (top left) *R. B. Southall addressing the ball,* (top centre) *Mrs D. A. Hough, having sent a good one down the fairway,* (top right) *J. S. Parker after a drive,* (bottom left) *H. W. Barnes wondering "where that one went",* (bottom centre) *Mr and Mrs D. A. Hough with C. E. R. Sams waiting to follow on, and* (bottom right) *H. E. Brown, the winner, showing strong determination.*

COUNCIL COMMENTARY

The usual monthly meeting of Council was held on 11 June with Mr R. B. Southall, vice-president, in the chair. The President was unavoidably absent on business.

The Summer Meeting will have been held by the time this appears in print. The response of members to this event has proved rather disappointing. It was hoped that considerable support from members home on leave from overseas would be forthcoming. However, this was not the case and the 80 or so people who applied for tickets represented in the main members living in Britain and their wives.

It has been suggested that groups should be formed within the Institute representing the various activities of the petroleum industry. Before the war two such groups were in existence, one dealing with lubricants and the other with bitumen and both of these were instrumental in gathering together members with similar interests. Council has asked Col Auld to look into this matter and he is to be assisted by an *ad hoc* committee which will make recommendations on the best method of implementing this decision.

Membership of Council Committees for the year 1952-3 was considered at this meeting. These committees all have a member of Council as chairman and they deal with the many and varied activities of the Institute. Those dealing with the intimate direction of affairs such as the House and Finance committees consist entirely of Council members. Others such as the Standardization, Engineering, and Publications committees draw their members both from within and without Council.

A few changes were made in the composition of these committees mainly due to changes in the composition of Council.

Publications committee reported that eight publications were being handled, the majority of which will be issued this year. These include *Standard Methods*, *Annual Reviews* for 1950 and 1951, *Modern Petroleum Technology*, *Petroleum Tables*, and the *Petroleum Measurement Manual*. The Publications Costing Sub-Committee is being strengthened by the inclusion of an additional member from the Finance Committee, and two additional members from Publications Committee. This sub-committee is responsible for the business side of the Institute's publications. Costs have greatly increased during the past year or so owing to the considerable rise in the cost of paper and printing.

Some discussion took place as to whether the Institute should undertake to answer technical enquiries received from its members. The Institute staff is not equipped to give detailed technical advice, but in a number of cases it is possible to indicate where the desired information can be found. It was pointed out that there might be some danger in the Institute setting itself up as a consultant. The matter was referred back for further discussion.

★ ★ ★

INSTRUCTIONAL FILMS

Oil and Industry, *Red Ruin*, *Diesel on the Farm*, and *Smoke Signals*, all Shell-Mex and B.P. films, have been granted certificates of educational value by the Ministry of Education.

The Scientific Film Association, 164 Shaftesbury Avenue, London, W.1, have recently published a revised edition of their *List of Films for Training in Industry* (Publication No. 65, price 7/6d) and a new book, *List of Distributors of Industrial Films* (Publication No. 66, price 3/6d).

LAS PALMAS BUNKER TERMINAL

A 36,000-ton Esso bunkering installation was recently opened in the territory of Las Palmas, Canary Islands. The terminal itself comprises three 12,000 ton tanks. Four miles of piping feed twelve fuel and eleven diesel outlets and the pipelines are supplemented by four diesel-driven pumps, capable of delivering 1100 tons per hour.

★ ★ ★

IRAQ PRODUCTION

Production of Iraq Petroleum Company in May reached a new high record —1,391,929 tons (44,901 tons daily), double the figure for January last. Basrah Petroleum Company also established a new record for monthly production, 214,723 tons (6927 daily), and Petroleum Development (Qatar) Ltd produced 259,201 tons (8361 daily). Total was 1,865,853 tons for the month.

★ ★ ★

BRITISH OIL EQUIPMENT

The Council of British Manufacturers of Petroleum Equipment has just issued a revised "Classified List of Petroleum Equipment" produced by its members, this being a reprint corrected to February 1952 of the classified list published in 1951 in "British Petroleum Equipment". Copies are available from the Council at 79 Buckingham Palace Road, London, S.W.1.

The list has some 1200 headings and sub-headings which serve to indicate the wide and varied needs of the oil industry and the ability of British industry to supply them. In this connexion, it is of interest to record the figures of oil companies' orders placed in the U.K. during 1951, these figures having been issued by the Oil Companies Materials Secretariat.

Value of Orders Placed by Oil Companies in the U.K. during 1951

	£
Geophysical and other exploratory equipment, etc.	25,400
Specialized equipment for oil drilling and production, including casing, tubing and drill-pipe, etc.	9,245,100
Specialized equipment for oil refineries, etc. (not including pumps and valves)	2,901,500
Drum and can making, filling and cleaning equipment, kerbside pumps and other oil metering and dispensing equipment, etc.	1,441,900
Railcars, road tankers, aircraft refuellers, etc.	332,700
Drums, drumsheets and tinplate	7,930,800
Tankage (including tank fittings)	5,434,200
Tubulars, pipe fittings, and valves (ferrous and non-ferrous)	16,055,400
Pumps (excluding slush, oilwell and kerbside)	1,274,000
Boilers, boiler house plant and accessories, etc.	560,400
Electrical equipment—motors, generators, transformers, etc.	4,269,300
Instruments, meters, gauges, etc.	796,800
Prime movers and compressors	1,610,300
Machine and hand tools, welding, and miscellaneous machinery and stores	5,966,100
Ferrous and non-ferrous plates, sections, sheets and bars	2,991,000
Automotive equipment, all types	6,124,900
Laboratory equipment and chemicals, including hospital and medical supplies	445,500
Bulk chemicals, catalysts, barytes, etc.	8,204,900
Cement and other building materials and hardware, including timber	4,281,100
Commissary, general requisites for office, warehouse, household, club, sports, etc.	4,100,100
	£83,991,400

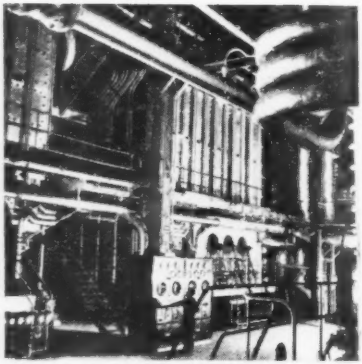
The CBMPE has also issued a booklet "The work of the Council" which gives information of the aims and activities of the Council.

GRANGEMOUTH REFINERY EXPANSION

Originally opened as far back as 1924, the Grangemouth refinery of Scottish Oils has since 1949 been undergoing a major expansion programme, of which the first stage—the increase of the crude throughput capacity, was completed early in 1951.

Stage 2, which is to provide for the production of premium grade motor spirits and special products, is scheduled for completion by the end of the current year. When the project is complete, and in full operation, it will give permanent employment for 700-800 people.

Under stage 1 of the expansion scheme, a modern distillation unit was installed, with the necessary treatment plants. This new plant has a nominal capacity of 30,000 barrels per day. Adjacent to the refinery is the new factory of British Petroleum Chemicals, a joint AIOC-Distillers Co enterprise, which produces chemicals for the plastic and other industries, using a petroleum-base feedstock supplied by the refinery.



The steam boiler plant.

The principal items of stage 2 are the installation of a cat cracker, a vacuum distillation unit, and a catalytic polymerization plant. Additional storage tanks, despatching lines and pumps, and larger road and rail car filling sheds are included in the plan, as well as new office and laboratory blocks.

An artist's impression of Grangemouth by Montague Black.

Foundations Problem

Normal piling technique is considered unsuitable since the refinery stands on a layer of silty mud 100 feet deep. Instead, foundations of reinforced concrete are built on the surface from pre-cast sections, to form rectangular cells. The earth is removed from each cell, causing the concrete mass to sink by its own weight until it is flush with ground level. Bottom and top sections are then added, and the whole forms a buoyant raft.

Shipping Facilities

Incoming supplies of crude for Grangemouth are drawn from the depot at Finnart on Loch Long, 60 miles distant, which is connected to the refinery by a 12-inch pipeline. Finnart depot is capable of accommodating ships of 28,000 tons and over, and during the first three months of this year handled 26 ships, including eight tankers of 24,000 and 28,000 tons.

★ ★ ★

FIRE AND FIRE RESEARCH

The April 1952 issue of the *F.P.A. Journal*, published by the Fire Protection Association (84 Queen Street, London, E.C.4) contains an account of the oil fire at Avonmouth Dock in September 1951 based on the reports of H.M. Chief Inspector of Explosives and by the Chief Officer of the Bristol Fire Brigade. Photographs and explanatory diagrams are included.

"Explosions in oil drums and tanks" is the title of a report by F. E. T. Kingman, E. H. Coleman, and Z. W. Rogowaki published by the Joint Fire Research organization (H.M.S.O., 6d. net). This report deals with experiments in 5- and 19-gallon drums to determine explosion risks when repairing drums which have contained kerosine, lubricating oil, and vegetable oils.

The work of the Joint Fire Research organization was also dealt with by S. H. Clarke in "Current fire research", a paper read to the Institution of Fire Engineers in June 1951. This paper is available in reprint form from Chantry Publications Ltd. (63 Neal Street, London, W.C.2.)

Other papers on the subject of oil fires which have appeared recently are:

Effect of methyl iodide and chlorobromomethane on the limits of inflammability of *n*-hexane in air. E. H. Coleman. *Fuel*, 1951, **30**, 114-5.

The fire hazards of oils in the woollen industry. F. E. T. Kingman and E. H. Coleman. *J. Textile Inst.*, 1951, **42**, T 402-11.

A mechanical foam-generator for use in laboratories. J. F. Fry and R. J. French. *J. Appl. Chem.*, 1951, **1**, 425-9.

A laboratory method of comparing the efficiencies of fire-fighting air-foams. J. F. Fry and R. J. French. *J. Appl. Chem.*, 1951, **1**, 429-33.

★ ★ ★

THEORY OF LUBRICATION

The theory of lubrication is made clear and interesting in a new film just released by Esso Petroleum Co. Ltd. Entitled *Lubrication* and running for 55 minutes, the subject is covered in four parts. First, the laws of friction are illustrated and then the principles of fluid-film lubrication are explained in detail. The third part discusses boundary lubrication, and finally there is a discourse on extreme pressure lubrication.

Throughout the film, in the making of which the company had the advice of Dr F. B. Bowden of Cambridge University, full use is made of modern laboratory techniques and apparatus.

The film (16mm sound) is available on loan to educational and other bodies to whom it should be of interest. Application should be made to the Manager, Industrial Sales Dept., Esso Petroleum Co. Ltd., 36, Queen Anne's Gate, London, S.W.1.

FARM TRACTORS IN UNITED KINGDOM

A census of farm machinery taken last January by the Agricultural Departments in the U.K. shows that the number of tractors then in use in each country was as follows:—

	England	*Wales*	*Scotland*	*Northern Ireland*	*United Kingdom*
Tracklayers } 10 h.p. & over	14,490	1,120	1,590	50	17,250
Wheeled } 10 h.p. & over	240,380	27,010	37,890	19,540	324,820
Total Agricultural Tractors	254,870	28,130	39,480	19,590	342,070
Tracklayers } under 10 h.p.	3,790	270	300	30	4,390
Wheeled } under 10 h.p.	36,060	1,840	2,350	480	40,730
Total Horticultural Tractors	39,850	2,110	2,650	510	45,120

Tractors in Use in United Kingdom: January, 1952
Fuel Types

	Diesel	*Petrol*	*P.V.O.*	*Total*
Tracklayers } 10 h.p. and over . . .	8,900	4,070	4,280	17,250
Wheeled } 10 h.p. and over . . .	12,450	53,480	258,890	324,820
Total Agricultural Tractors . . .	21,350	57,550	263,170	342,070
Tracklayers } under 10 h.p.	—	4,390	—	4,390
Wheeled } under 10 h.p.	—	40,730	—	40,730
Total Horticultural Tractors . . .	—	45,120	—	45,120

Interest has been shown in the number of tractors which use the different kinds of fuel—diesel, gasoline, and vaporizing oil. It is possible to make a fairly reasonable estimate of the fuel types by analysing tractor supplies in the preceding years—home production for the home market and imports. It has to be assumed that tractors of all fuel types have been scrapped at the same rate and no attempt has been made to assess the extent to which gasoline tractors have been converted to burn power vaporizing oil.

In Northern Ireland the figures for agricultural wheeled tractors were actually collected on a fuel type basis: diesel, 120; gasoline, 6580; power vaporizing oil, 12,840; the proportion of petrol burning tractors is very much larger than in the rest of the United Kingdom.

SULPHUR RECOVERY AT STANLOW

The sulphur-recovery plant at Shell's Stanlow refinery is now in operation. This first commercial production of raw sulphur in the U.K. will contribute to the country's dollar-saving effort, since sulphur is imported mainly from the U.S.A.

In addition a sulphuric acid plant is to be installed at Stanlow by the end of the year, to fulfil the refinery's acid requirements. Total cost of these facilities is estimated at £500,000 to £600,000.

PERSONAL NOTES

Dr G. Egloff, F.Inst.Pet., has been elected honorary chairman of the Second International Art Exhibit which will be part of the Seventh National Chemical Exposition at Chicago, 9-13 September 1952.

J. A. Jameson, C.B.E., F.Inst.Pet., has been elected to the honorary membership of the Institution of Mechanical Engineers for distinction in the practice, organization, and administration of engineering.

C. E. Nabuco de Araujo

C. E. Nabuco de Araujo, Jr, F.Inst.Pet., has been elected to the Board of Directors of the Standard Oil Co of Brazil.

Col S. J. M. Auld, O.B.E., M.C., past-president, has become a member of the General Council of the British Standards Institution. He is chairman of BSI's Petroleum Industry Standards Committee and a member of their Chemical Divisional Council.

J. G. Bean

J. C. Cragg

J. G. Bean, M.Inst.Pet., formerly manager of C. C. Wakefield's Stanlow installation, has been appointed chief production engineer of the entire Wakefield group of Companies. **J. C. Cragg**, F.Inst.Pet., has become manager at Stanlow and **R. W. Pilsbury**, A.M.Inst.Pet., assistant manager.

K. A. Spencer is proceeding to consulting corrosion engineering practice with special emphasis on coating materials and application of cathodic protection. His addresses will be 5 Greencourt Road, Petts Wood, Kent, and 40 South Street, London, W.1.

Dr E. W. Dean, F.Inst.Pet., officially represented the API at the Golden Anniversary Meeting of the ASTM in New York in June last.

★ ★ ★

FIREBRICKS

Technical data on firebricks are contained in a 39-page booklet issued by John G. Stein & Co. Ltd, of Bonnybridge, Scotland, manufacturers of refractories. Among the data included are expansion curves and allowances, thermal conductivity values and lighting up procedure and there is a full-page plan of a section of a blast furnace in which sizes of the bricks employed are indicated. There are six pages of tables of standard firebrick sizes.

★ ★ ★

Esso Scottish Division headquarters is now at 36 Renfield Street, Glasgow.

COMPANY PRODUCTION—CRUDE OIL

	1952	
	May	*June*
	Brl.	
Kern Oil Co Ltd:—		
California	112,724	110,993
Trinidad	68,690	65,855
British Controlled Oilfields Ltd:—		
Venezuela:		
Western area	12,950	12,731
Central area	16,218	14,611
Trinidad Petroleum Development Co	258,421	262,390
	tons	
Kuwait Oil Co Ltd	3,276,800	—

★ ★ ★

1952 Weldirectory. The physical properties and detailed welding procedure for all Lincoln Welding electrodes are given in a 44-page booklet available from Lincoln Electric Co, Welwyn Garden City, Herts.

ATHABASCA OIL SANDS

In the 1951 report* of the Research Council of Alberta, it is recorded that the oil in the Alberta oil sands contains appreciable quantities of vanadium, and laboratory investigations have confirmed that about half the total vanadium contents occurs as a mineral. The remainder is distributed throughout the oil, being more concentrated in the resin and asphaltene fractions.

Sand Flow

In processing the oil sands a ton of sand must be wasted for every barrel of oil produced and methods of sand disposal need consideration. Pipeline disposal requires the production of a suspension of sand in water and the pumping of the suspension. A study of the friction factor showed that at high rates of flow the movement was essentially as for homogeneous fluids, but that at low rates the friction factor was abnormally high.

Electrothermal Treatment

Laboratory work on the electrical resistance of the oil sand confirmed that high-potential electrical heating of the sand could be accomplished after breakthrough had been established.

Block-caving Mining

Experiments were made on the mining of the oils and by block-caving whereby a steam atmosphere in stopes would raise the stope surface temperature sufficient to cause the sand to soften and flow. It was found that no flow took place under these conditions.

*Thirty-second Annual Report of the Research Council of Alberta," pp. 31. Edmonton, Alberta: The Council, 1952. 5 cents.

★ ★ ★

Designed by Messrs. John I. Thornycroft & Co Ltd, for fuelling the Comet jet airliners at Singapore and Bangkok is the Thornet fueller, a petrol-engined pumping unit and semi-trailer with tank. The tractor portion has a Thornycroft "Sturdy Star" chassis, a fifth wheel attachment having been provided at its rear to enable it to be hitched to the tank unit. Capacity of units is 1,800 gallons of aviation turbine fuel for Singapore fuellers and 1,500 gallons for Bangkok.

★ ★ ★

Standard Oil Company (Indiana) is to build a new iso-octyl alcohol plant at Wood River, Illinois. The plant will be in three sections: fractionation of heptane from olefin feed stock; hydrogen and carbon monoxide from reformed refinery gas; synthesis of heptane, hydrogen, and carbon monoxide to iso-octyl alcohol. The M. W. Kellogg Co are to construct the plant, the first two sections of which are to their design, the third section being designed by Standard.

★ ★ ★

Stanlow Refinery Construction by Whessoe.—Under this title an attractive booklet recently published illustrates plant and its erection at Stanlow refinery. Copies are available from the Librarian, Whessoe Ltd., Darlington, or 25 Victoria Street, London, S.W.1.

★ ★ ★

"Get to Know France." For the benefit of English visitors to France, Shell-Mex & B.P. Ltd. have available a series of descriptive booklets, each of which gives four itineraries off the beaten track, a sketch map, and illustrated descriptions of the area. Areas covered are: I. Normandy, II. Provence-Côte d'Azur, III. Brittany, IV. Landes-Bearn-Basque country, VII. L'Ile de France, VIII. Valley of the Loire. The booklets are translations of the series published by Shell Française and are obtainable free from Shell-Mex & B.P. Touring Service, Shell-Mex House, Strand, London, W.C.2.

PETROLEUM FILMS BUREAU

The 1952 list of 35 and 16mm documentary and instructional films which are available on free loan from the Petroleum Films Bureau is an impressive document. It lists 139 films, 23 of which are additions since the 1951 list, and the wide range of interest are indicated by the following list of subject headings:

	No. of Films
PETROLEUM	
General	5
Exploration, production, and transport	14
Refining	9
Products and uses	7
AVIATION & MOTORING	
Aviation general	8
Motor racing, etc.	7
POWER & ENGINEERING	
Theoretical	14
Aeronautical	10
Industrial	8
AGRICULTURE	7
MISCELLANEOUS	7
FILM MAGAZINES	13
CRAFTSMEN	7
OIL REVIEWS	15
SAFETY FIRST	
Road safety for children	5
Industrial	3

Copies of the list are available from the Bureau at 29 New Bond Street, London, W.1.

★ ★ ★

BRITISH OIL BURNER MANUFACTURERS ASSOCIATION

At the recent AGM of the Association, A. G. Dobbs (*Wallsend Slipway & Engineering Co. Ltd.*) was elected president in succession to R. H. G. Sutton. Other officers are: Vice-Presidents—J. R. C. Boyce (*British Oil Burners, Ltd.*), J. Fitzgerald (*Combustions Ltd.*), Members of Council—T. T. Brown (*Swinney Bros. Ltd.*), W. A. Hubbard (*Hubbard Combustion Ltd.*), O. Meikle (*May Oil Burner (England) Ltd.*), W. C. J. Mollison (*Todd Oil Burners Ltd.*), F. C. Pillinger (*G. C. Pillinger & Co. Ltd.*), R. H. G. Sutton, Hon. Sec. (*Urquhart's (1926) Ltd.*)

Photo by Shell-Mex & BP Ltd.

Seen at Battersea Park Festival Gardens—the Shell By-plane, the design of which was conjured up by Rowland Emett, with the aid of Professor Septimus Urge. The "Shell Magazine" reports the designers "spent high and hazardous days observing the habits of blow lamps and the bursting-points of bathroom geysers." They scoured the country for curtain poles, cast-off shrimp boats, and hip baths to hold heavy water. The result has to be seen to be believed.

★ ★ ★

BRITISH STANDARDS

Details of British Standards numbering up to 1849 are given in the "British Standards Yearbook", the 1952 edition of which has just appeared and which is complete to 31 March 1952. In addition there are 25 standards on ship and ship machinery fittings, 40 on automobile material and parts, numerous codes of practice for buildings, and a number of special publications on various subjects.

★ ★ ★

Twin-Arc Process. A 16-page brochure (T.C. 854) has been produced by the Quasi-Arc Co Ltd, Bilston, Staffs. It contains technical descriptions of the Twin Arc plant and of R. Electrodes, together with deposition data and welding instructions.

TANKERS RENAMED

Three 850-ton tankers, formerly used to carry fresh water to Kuwait, have been renamed and put into service in British coastal waters. The *Adib* became *BP Transporter*, *Amir* the *BP Distributor*, and the *Amin*, the *Shell Fitter*.

Plant for condensing sea water at Kuwait has reduced the need for transporting fresh water by ships.

Other coastal tankers owned by Shell-Mex and B.P. Ltd and operated in coastal waters have also been renamed.

PETROLEUM IN PARLIAMENT

U.K. Motor Fuel Consumption

In a written reply on 24 June the Chancellor of the Exchequer said that the amount of each class of hydrocarbon oil retained for home consumption during the year ended 31 March 1952, and the net amount received in respect of duty and in particular the amounts received in respect of motor spirit and heavy oils used as fuel in road vehicles, was as given in the table below:

Class	Quantity (Gallons)	Receipts £
	Oils chargeable with Customs Duty	
Light Oils	1,791,087,417	169,192,331
Of which motor (including aviation) spirit	(1,737,923,143)	(164,136,944)
Heavy Oils for use as road fuel	283,789,103	26,868,576
Other Heavy Oils	4,133,156,682	666,210
Of which fully rebateable	(3,973,273,313)	
	Oils chargeable with Excise Duty	
Light Oils	72,599,483	4,125,076
Of which motor (including aviation) spirit	(32,155,694)	(1,822,182)
Heavy Oils for use as road fuel	22,401,397	1,284,012
TOTAL		£202,136,205
Allowances under Section 8 (4) of the Finance (No. 2) Act, 1945		1,588,138
NET TOTAL		£200,548,067

Overseas Refineries

The Minister of Fuel and Power was asked on 30 June whether he could give an assurance that British firms were asked to quote for the designing and erection of the new oil refineries at Aden and in other parts of the Commonwealth, and also whether he could give a similar assurance regarding oil refineries in the U.K.

Mr Geoffrey Lloyd said he was confident that the companies concerned would continue to give British contracting firms the opportunity to tender for work. In a further reply, the Minister said that the work of providing for the needs of the oil industry was a comparatively new development in the U.K., but the output had increased from £10 million before the war to £80 million now.

Tanker Freights

The Minister of Fuel and Power said on 30 June that he was not aware of a forecast that tanker freights were to be reduced from 185s to 100s per ton in the near future.

The Tintometer Ltd. has appointed Messrs. Curry & Paxton Inc, 101 Park Avenue, New York 17, as agent and stockist for the U.S.A.

Papua Exploration. The number of geophysical parties in Papua has been increased from two to three.

ECONOMICS OF STANDARDIZATION

An attempt to assess in terms of dollars or percentages the savings and specific economic benefits attributable to standardization has been made by the American Standards Association. A 32-page survey "Dollar Savings Through Standards"* reports 140 documented case studies, covering 81 industries and industrial products. Cases are indexed by industries and by subjects.

*From Productivity and Technical Co-operation Divn, Mutual Security Agency, American Embassy, London, W.1.

★ ★ ★

"Natural Gas Supply and Federal Regulations." Reprints are available from the Chase National Bank, New York, of a paper read by Lyon F. Terry, vice-president of the Bank, at a recent API meeting. The author concludes that "There can be a supply of natural gas in this country [U.S.A.] sufficient to meet the needs of the rapidly increasing demand, provided the gas producers are encouraged to search for new reserves."

FORTHCOMING MEETINGS

THE INSTITUTE

Mud Control in the Fields of the Iraq Petroleum and Associated Companies. A. W. Paxton. At 26 Portland Place, London, W.1. 5.30 p.m. (*tea 5 p.m.*), 10 September.

Methods of Atomizing Liquid Fuels. J. R. Joyce (*Thornton Research Centre, Shell Petroleum Co. Ltd.*). At 26 Portland Place, London, W.1, 5.30 p.m. (*tea 5 p.m.*), 8 October.

Distribution of Petroleum in the U.K. The Changing Pattern. T. W. Mathias, M.A. (*Shell-Mex & B.P. Ltd.*). At 26 Portland Place, London, W.1, 5.30 p.m. (*tea 5 p.m.*), 22 October.

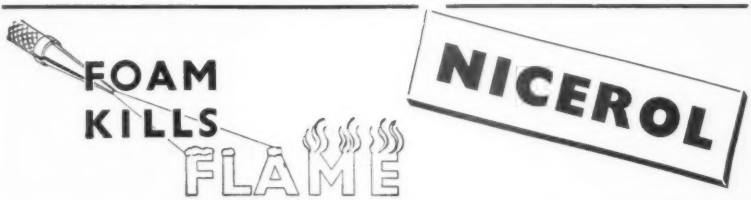
London Branch

The Automobile—Today, Tomorrow. E. B. V. Potter (*Esso Development Co. Ltd.*). At 26 Portland Place, London, W.1, 6.0 p.m. (*tea 5.30 p.m.*). 24 September.

Stanlow Branch

The Kirkuk-Banias Pipeline. H. S. Gibson, C.B.E., M.A., M.I.Mech.E. (*Iraq Petroleum Co. Ltd.*). At Grosvenor Hotel, Chester, 7.30 p.m. 15 October.

Modern Methods of Motor Gasoline Manufacture. K. Owen, M.Sc. At Empire Café, Morecambe, 8.30 p.m. 23 October.



Speedily and without fail Nicerol Foam KILLS petrol and oil fires—and is used by the Royal Navy, Royal Air Force and Oil Companies specifically for that purpose. Nicerol is a concentrate producing a ***heavy type of vapour-sealing foam*** which flows with creeping flame, blanketing and killing the fire—resisting effectively all possible flash-back or re-ignition. Any type of mechanical or air-foam apparatus will produce foam from Nicerol —either with ***fresh*** or ***salt*** water. Used also by Fire Equipment Manufacturers, Civil Air Lines, Commonwealth and Foreign Governments and Fire Brigades.

Nicerol is supplied in new heavy gauge steel drums specially designed to permit quick release and clean pouring of contents. These are supplied in 2, 5 or 40 Imperial gallons capacity. 3 gallons of Nicerol will produce over 1,100 gallons of pure white foam.

Sample and illustrated leaflet supplied, with quotation, on request

NICEROL LIMITED • LISBURN • N. IRELAND

Telephone LISBURN 2027 *Telegrams: Nicerol, Lisburn*

SM42

The 31-foot lengths of 30-inch pipe manufactured for the Iraq Petroleum Company were frequently pre-welded into 93-foot lengths before being taken into the desert for welding together into the 556-mile pipe-line from Kirkuk in Iraq to Banias in Syria, Lincoln electrodes being used in both operations.

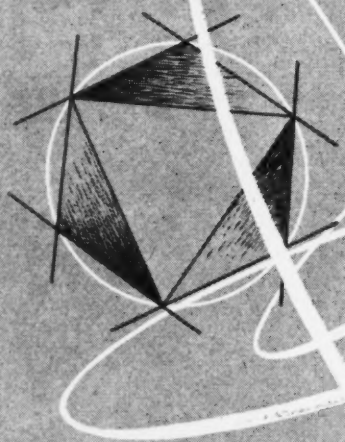
'We ought to ask Lincoln before we decide'

World's largest manufacturers of arc-welding equipment and electrodes

LINCOLN

LINCOLN ELECTRIC CO LTD · WELWYN GARDEN CITY · HERTS · WELWYN GARDEN 92

ACTIVATED ALUMINA and Catalysts



The Spence organisation offers a unique service to users of catalysts and adsorbents. These products, prepared to customers' individual requirements, are supplied in quantities from a few ounces to many tons. During research and development of new projects, modifications in catalyst formulation, particle size, etc. may all be evaluated on small samples, prepared under conditions comparable to the final works scale. This parallel development of adsorbent or catalyst ensures that there is the minimum difficulty and delay in translating successful development projects to large scale production.

SPENCE

CHEMICALS FOR INDUSTRY

PETER SPENCE & SONS, LTD., WIDNES, LANCS., and at London and Bristol

Colour Measurement

covers more than the colour grading of petroleum and its products

★

All Lovibond Comparators and B.D.H. Lovibond Nessleriser discs mentioned in the Standard Methods for Testing Tar and its Products handbook . . . ARE AVAILABLE FROM STOCK

★

THE TINTOMETER LTD.

SALISBURY, ENGLAND

VISCOSITY

LABORATORY ACCURACY UNDER INDUSTRIAL CONDITIONS

A portable viscometer for industrial use which satisfies laboratory standards of accuracy. Suitable for rapid continuous evaluation of the viscosity and flow properties of liquids and semi-liquids contained in any vessel from a vat down to as small as 2½" dia. Easily cleaned, robust, weighs only 4lb. mains-operated.

Quick-change gear box and interchangeable inner cylinders extend the range from a few centipoises to several hundred thousand poises. Anomalous flow behaviour and non-Newtonian properties such as yield value and thixotropy may be investigated by plotting curves or using the maximum-indicating friction pointer.

Please write for List IN.125

FERRANTI

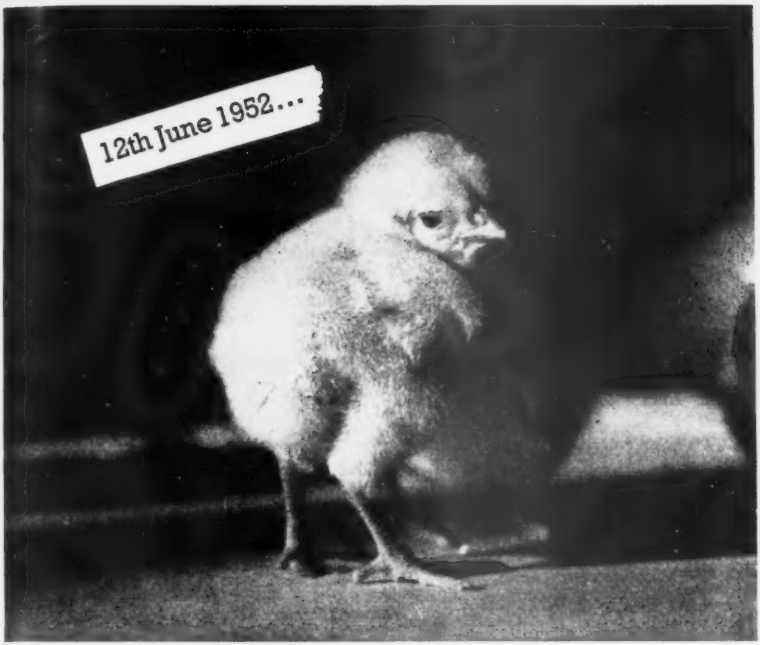
Model VL for Low Viscosit readings from 0–625 centipoi
Model VM for Medium Viscosit readings from 0–13,500 c
Model VH for High Viscosit readings from 0–20,000,000 c

FERRANTI

PORTABLE VISCOMETER

FERRANTI LTD., HOLLINWOOD, LANCS. *LONDON OFFICE :* **KERN HOUSE, KINGSWAY, W.C**

FI.99A



. . . . AND AT PRECISELY 11.54 a.m.

. . . . this chick emerged from its shell into a jet-propelled world. It arrived in exactly the same way as chicks have done from time immemorial — for in these matters Nature dislikes change.

Man-made science on the other hand is making extraordinary progress, particularly in the field of power and speed. As standards of engine performance are raised, the demand is for new and more efficient lubricants. Today, Paramins enable oil compounders to anticipate many rapidly changing requirements and to supply higher quality lubricants to meet more stringent specifications.

PARAMINS

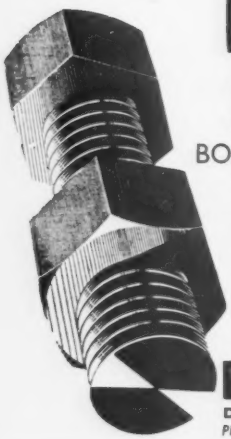
Paraflow PDX Pour Point Depressant, Paratone Viscosity Index Improver, Paranox Range of Detergent Inhibitors, Paratac Stringiness Agent, Vistone B Oiliness Agent.

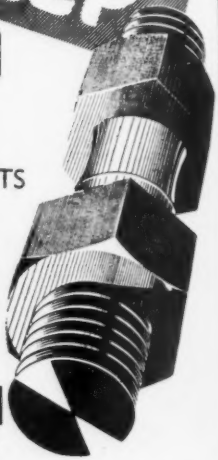
ESSO PETROLEUM COMPANY, LIMITED, 36 QUEEN ANNE'S GATE, LONDON, S.W.1

Eliminate "CREEP"

WITH

Marwin





HIGH TEMPERATURE
CREEP RESISTING STUDS
BOLTS, NUTS & SPECIAL PARTS

A positive defence against the effects of heat, these "Marwin" Products resist "creep" at elevated temperatures, resist embrittlement from exposures to high temperature stresses and at the same time retain high tensile strength at elevated temperatures. Write for details.

W. MARTIN WINN LTD

DARLASTON : : S. STAFFS.

Phone: Darlaston 72/3/4. Grams: "Accuracy, Darlaston."

PENETROMETER

with automatic control . . . . . .

Used for penetration tests of bituminous materials, petrolatum and grease to I.P. and A.S.T.M. specifications, this instrument can be operated manually or by means of the automatic control box illustrated. It is available for immediate delivery.

Its six-inch diameter dial graduated in 1/10 mm. to read 40 mm. in one revolution provides quick and accurate readings, whilst the control box ensures extreme accuracy to the penetration period.

Please write for full details of this instrument and other Petroleum Testing Equipment to:

PETROLEUM EQUIPMENT SALES DIVISION

W & J GEORGE & BECKER LTD

NIVOC HOUSE
EALING ROAD, ALPERTON, WEMBLEY
MIDDLESEX
Telephone: PERivale 3344

157 GT. CHARLES ST., BIRMINGHAM 3
Telephone: CENtral 7641

LABORATORY FURNISHERS AND MANUFACTURERS OF SCIENTIFIC APPARATUS

P20

STRUCTURES IN STEEL

We Specialise in

ALL TYPES OF STRUCTURES

required for

Oil Production and Refining.

ALSO

'KELVIN' *all iron* and **'MAINSTEEL' PALISADING**
and **All** Types of **FENCING**
for **HOME** and **OVERSEAS.**

A. & J. MAIN & CO., LIMITED

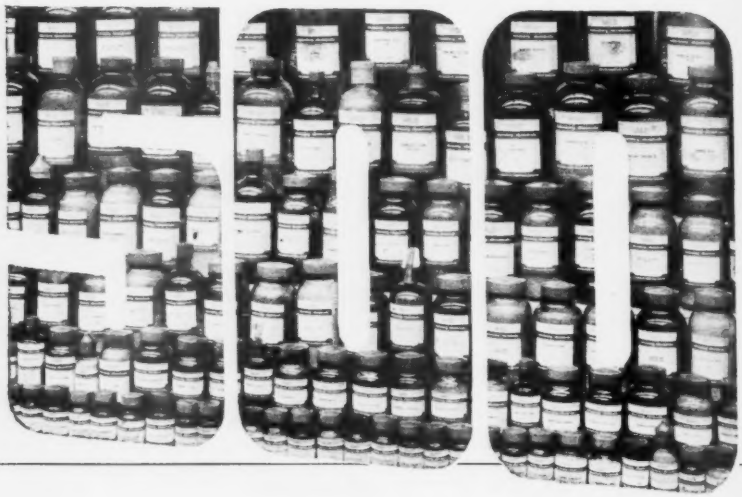
LONDON: VINCENT HOUSE, VINCENT SQUARE, S.W.1
Telephones: Victoria 8375/6/7/8 *Telegrams:* Kelvin Sowest, London

WORKS AND REGISTERED OFFICE

CLYDESDALE IRONWORKS, POSSILPARK, GLASGOW, C.2
Telephone: Possil 8381 *Telegrams:* Kelvin, Glasgow

CALCUTTA: Post Box 36, 16 NETAJI SUBHAS ROAD
Also Nairobi and Chittagong

FOR YOUR
EVERYDAY LABORATORY REQUIREMENTS



...*insist on* **M&B**

Over 500 different organic and inorganic chemicals, all produced to published laboratory standards, are available to the user of the **M&B** range. Drawing from long experience in the manufacture and use of fine chemicals, we have made a selection of specifications to serve a wide variety of procedures in general laboratory practice. These specifications are clearly set out on the labels of the containers, giving immediate indication of the field of usefulness of the contents, and are carefully maintained by modern methods of analytical control.

Pre-packed stocks of every item in popular-sized containers are held at Dagenham and by stockists throughout the country, so that orders can be promptly dealt with. Moreover, the specially designed bottles are convenient to handle, and ensure that the contents are adequately protected in storage and transit.

M&B
LABORATORY CHEMICALS & REAGENTS

manufactured by

MAY & BAKER LTD · DAGENHAM · ENGLAND

Telephone ILFord 3060. Extension 40

LA

Richmond Hill Printing Works, Ltd., Bournemouth

WE

FOR
30 YEARS
WE HAVE
SERVED THE
OIL TRADE
EXCLUSIVELY.

ECLIPSOL OIL CO. LTD.

WHOLESALE MANUFACTURERS AND BLENDERS

ROEBUCK LANE, WEST BROMWICH

PHONE
WEST BROMWICH 0431-2-3-4

GRAMS:
SOLUBLE, WEST BROMWICH

THE Metal Containers PAIL
-closes easily
PRIOR TO CLOSING
SEALED
DIE-CURLED LIP
JOINTLESS RUBBER SEAL
STRENGTHENING BEAD
-opens easily
OPENING
SCREWDRIVER
-pours easily
POURER SPOUT
CLOSED
OPEN
With its hermetic, liquid-tight closure and reduced bottom for ease of stacking the Metal Containers Pail can in addition be equipped with standard fittings such as a press-cap to be used when packing liquids. Capacity range at present is 2, 3, 4 and 5 gallons.

METAL CONTAINERS LTD., 17 WATERLOO PLACE, PALL MALL, LONDON
WORKS: ELLESMERE PORT & RENFREW. ASSOCIATED COMPANIES OVERSEAS